Allstar PZL Glider

FLIGHT MANUAL

GLIDER
1 „ACRO”

Factory No.: 59 **590.A.14.016**

Registration No.

THIS FLIGHT MANUAL IS A DIRECT TRANSLATION FROM THE EASA APPROVED POLISH VERSION

TRANSLATION OF THIS DOCUMENT AND CONVERSION OF TECHNICAL DATA HAVE BEEN DONE BY BEST KNOWLEDGE AND JUDGMENT

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THIS SAILPLANE IS TO BE OPERATED IN COMPLIANCE WITH INFORMATION AND LIMITATIONS CONTAINED HEREIN. THIS DOCUMENT SHOULD ALWAYS BE CARRIED ON BOARD.

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0.1. Record of revisions

Any revision of the present Manual, except actual weighing data, must be recorded in the following table and endorsed by EASA.

The new or amended text in the revised page will be indicated by a black vertical line in the left hand margin and the Revision No. and the date will be shown on the bottom left hand of the page.

With every revision implementation, the pages affected with this revision and listed in the following table must be replaced.

Rev. No.	Affected Section	Affected Pages	Date of Issue	Date of Approval	Date of Insertion	Signature

0.2. List of effective pages

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SECTION 1.

GENERAL

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1.1. Introduction

This sailplane flight manual has been prepared to provide pilots and instructors with information for the safe and efficient operation of the SZD-59-1 ACRO sailplane.

The manual includes the material required to be furnished to the pilot by CS-22. It also contains supplemental data supplied by the manufacturer.

1.2. Certification basis

This type sailplane designated SZD-59-1 “Acro” has been approved for operation by the airworthiness authority in accordance with CS-22 including Amendment 2 and the Type Certificate No. PL TC 198 and Major Change Approval No. 10064022 issued 12 December 2017.

Category of Airworthiness:

A – Aerobatic – applies to the sailplane in its aerobatic version of 13,2 m (43,3 ft) span, intended for performing aerobatic manoeuvres.

U – Utility – applies to the sailplane in its standard version with wing span extended to 15 m (49,2 ft) and the water ballast in wings, intended for normal soaring flights.

1.3. Warnings, Cautions and Notes

The warnings, cautions and notes used in the Flight Manual are defined as follows:

WARNING : means that the non-observation of the corresponding procedure leads to an immediate or considerable degradation of flight safety.

CAUTION : means that the non-observation of the corresponding procedure leads to a minor or to a more or less long term degradation of flight safety.

NOTE : draws the attention to any special item not directly related to safety but which is important or unusual.

1.4. Description and technical data

SZD-59-1 “ACRO” is a shoulder wing, monoplace sailplane with cross tail arrangement.

The basic structure is of glass/epoxy composite.

The glider may be operated in two versions:

- Aerobatic, with wing of 13,2 m (43,3 ft) span:
- Standard, with wing of 15 m (49,2 ft) span (after connection of tips) with integral water ballast tanks in wings. The detachable wing tips are equipped with winglets.

The tapered wing employs the NN-8 airfoil, constant over the entire span. In the Aerobatic version it has two, in the Standard version four panels.

It has a monospar structure and sandwich covering, the box-type spar has caps of glass rovings.

The water ballast tanks are located in the front torsion box of the wing.

The wing panels are connected in the centre by one bolt. The 20 percent chord ailerons consist of one panel each, actuated by one external drive-lever.

The two-plate metal airbrakes extend on upper wing surfaces only and have spring-loaded composite caps fitted to the wing contour.

The fuselage integral with the fin is made up of two composite shells. The tubular fuselage part is stiffened with semiframes. In the central part of the fuselage a steel framework carries the 350 mm diameter non-sprung retractable wheel.

The one piece, front hinged canopy opens upwards with two locking handles located on the canopy frame.

The pilot’s position in the cockpit can be adjusted by in-flight adjustable pedals and a back-rest adjustable on the ground.

The antenna is installed in the fin leading edge with a feed line leading to the instrument panel.

The stabilizer is of sandwich structure.

The elevator and rudder are mass balanced.

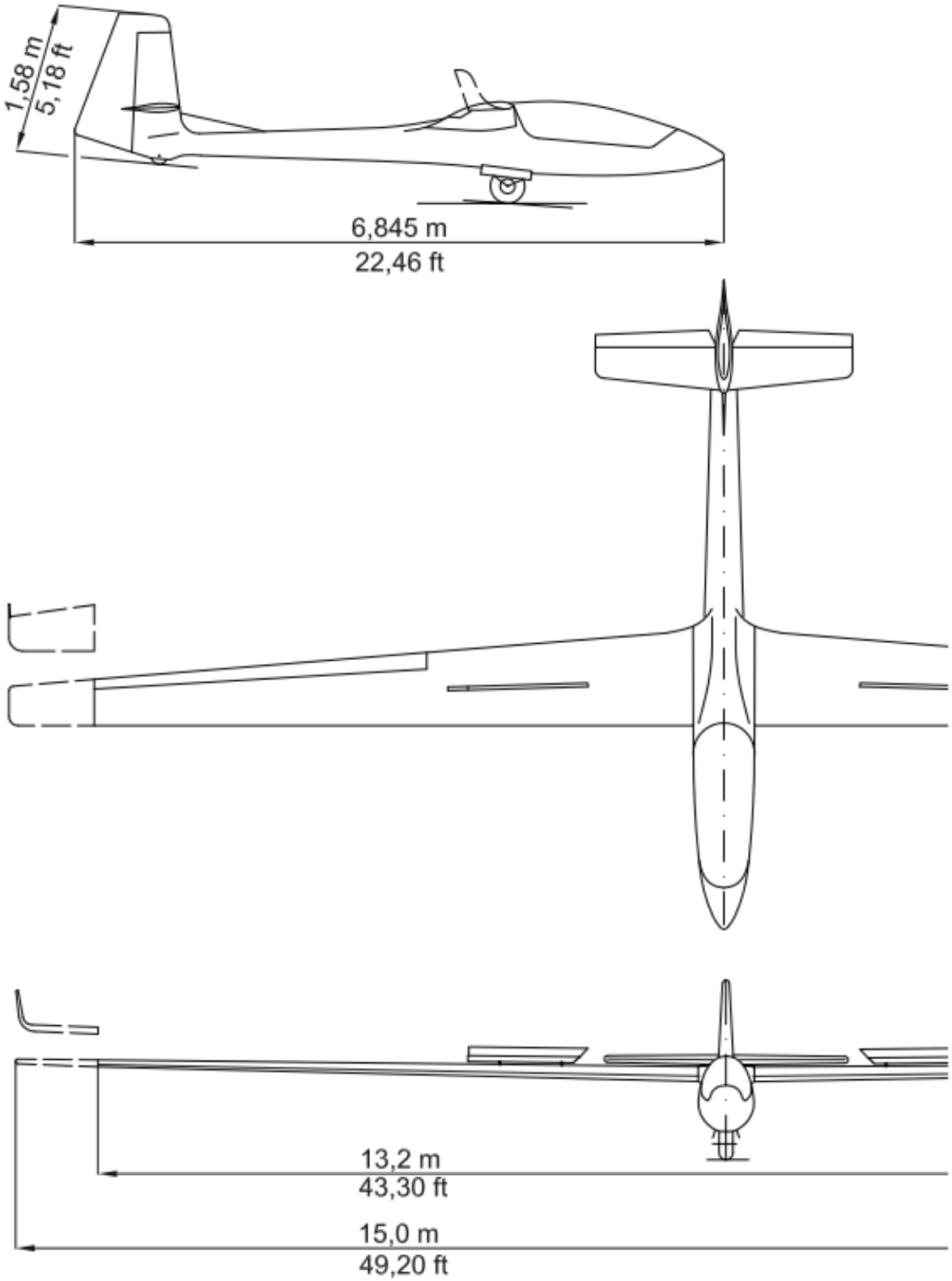
The aero-towing hook is installed in the fuselage front part and the winch-launching hook on the undercarriage.

Ailerons, airbrakes and elevator are operated by push-rods, rudder, towing-hooks and wheel brake by cables.

BASIC TECHNICAL DATA:

	Version			
	Aerobatic		Standard	
Span	13,20 m	(43,30 ft)	15,00 m	(49,20 ft)
Length	6,845 m	(22,46 ft)	6,845 m	(22,46 ft)
Height	1,58 m	(5,18 ft)	1,58 m	(5,18 ft)
Wing area	9,79 m^2	(105,4 ft^2)	10,66 m^2	(114,7 ft^2)
Aspect ratio	17,79		21,11	
Dihedral	$1,5^0$		$1,5^0$	
Root chord	0,95 m	(3,117 ft)	0,95 m	(3,117 ft)
Mean Standard Chord	0,7654 m	(2,511 ft)	0,7424 m	(2,436 ft)
Airfoil section	NN-8		NN-8	
Tailplane span	2,63 m	(8,629 ft)	2,63 m	(8,629 ft)
Maximum in-flight mass	380 kg	(838 lb)	540 kg	(1190 lb)
Maximum wing loading	38,82 kg/m^2	(7,958 lb/ft^2)	50,66 kg/m^2	(10,385 lb/ft^2)

1.5. Three-view drawing



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2.1. Introduction

Section 2 includes operating limitations, instrument markings and basic placards necessary for safe operation of the sailplane, its standard systems and standard equipment.

The limitations included in this Section and in Section 9 are approved by the Airworthiness Authority (Civil Aircraft Inspection Board).

2.2. Airspeed

Airspeed limitations and their operational significance are shown below:

	AIRSPEED	IAS	REMARKS
V_{NE}	Never exceed speed	**Acro version** 285 km/h (154 kn , 177 ,mph) **Standard version** 265 km/h (143 kn , 165 mph)	Do not exceed this speed in any operation and do not use more than 1/3 of control deflections.
V_{RA}	Rough air speed	200 km/h (108 kn , 124 mph)	Do not exceed this speed except in smooth air and then only with caution. Examples of rough-air are lee-wave rotors, thunderclouds etc.
V_A	Manoeuvring speed	200 km/h (108 kn , 124 mph)	Do not make full or abrupt control movements above this speed, since under certain conditions the glider may be overstressed by full control deflections.
V_T	Maximum aerotowing speed	150 km/h (81 kn , 93 mph)	Do not exceed this speed during aerotowing.
V_W	Maximum winch launching speed	150 km/h (81 kn , 93 mph)	Do not exceed this speed during winch launching.
V_{LO}	Maximum landing gear operating speed	**Acro version** 285 km/h (154 kn , 177 mph) **Standard version** 265 km/h (143 kn , 165 mph)	Do not extend or retract the undercarriage at airspeeds above this limit.

In the table below the allowed V_{NE} values for different flight altitudes are given:

Absoloute altitude	km	0÷2	3	4	5	6	8	10
	x1000ft	0÷6,6	9,8	13,1	16,4	19,7	26,2	32,8
V_{NE} (IAS) Aerobatic version	km/h	285	271	257	244	231	206	182
	kn	154	146	139	131	125	111	98
	mph	177	168	159	151	143	128	113
V_{NE} (IAS) Standard version	km/h	265	252	239	227	215	191	170
	kn	143	136	129	123	116	103	92
	mph	164	156	148	141	133	118	105

2.3. Airspeed indicator and accelerometer markings

Airspeed indicator markings and their colour-code significance are shown below and on the next page:

Marking	IAS range or value	Significance
GREEN arc	95 ÷ 200 km/h (51 ÷ 108 kn , 59 ÷ 124 mph)	**Normal operating range** (lower limit is $1.1 \cdot V_{S1}$ at maximum mass and most forward c.g. location, upper limit is rough air speed).
YELLOW arc (contin.)	200 ÷ 265 km/h (108 ÷ 143 kn , 124 ÷ 164 mph)	Manoeuvres must be performed with caution and only in smooth air.
radial RED line with "**U**" letter	265 km/h (143 kn , 164 mph)	Maximum speed for all operations of glider in standard version.
YELLOW arc (dotted)	265 ÷ 285 km/h (143 ÷ 154 kn , 164 ÷ 177 mph)	Manoeuvres must be performed with caution and only in smooth air (**aerobatic version**).
radial RED line with "**A**" letter	285 km/h (154 kn , 175 mph)	Maximum speed for all operations of glider in **aerobatic version**.
YELLOW triangle	95 km/h (51 kn , 59 mph)	Approach speed at maximum mass without water ballast.

V_{S1} = sailplane stalling speed at given mass, with airbrakes retracted.

Airspeed Indicator markings

Accelerometer markings

2.4. Mass (weight)

	VERSION			
	AEROBATIC		STANDARD	
	kg	lb	kg	lb
Maximum take-off mass:				
- without water ballast	380	838	390	860
- with water ballast	---	---	540	1191
Maximum landing mass	380	838	540	1191
Maximum load mass	116	256	116	256
Minimum load mass	65	143	65	143
Maximum water ballast mass	---	---	150	331
Maximum mass of all non-lifting parts	132	291	132	291
Maximum mass in baggage compartment:				
- central	20	44	20	44
- rear	8	18	8	18
Maximum mass of additional equipment in instrument panel	4	9	4	9

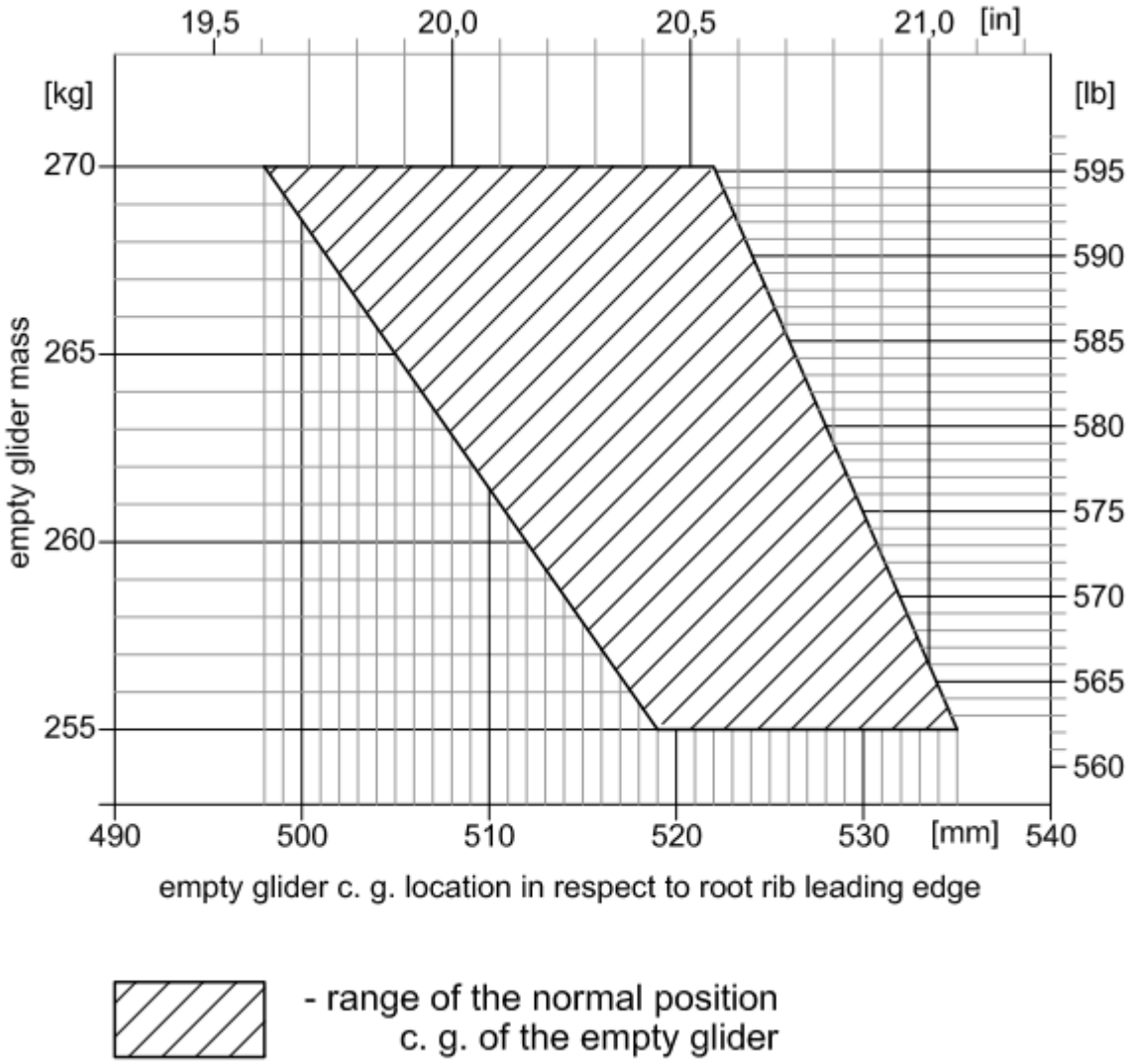
2.5. Centre of gravity

The c.g. location limits are the following:

- front limit **0,145** m (**5,713** in) aft of **datum point** which corresponds to:
  19 per cent of **MSC** in Aerobatic version,
  19.5 per cent of **MSC** in Standard version,

- rear limit **0,275** m (**10,835** in) aft of **datum point** which corresponds to:
  36 per cent of **MSC** in Aerobatic version,
  37 per cent of **MSC** in Standard version.

The **datum point** is the leading edge at root rib.
MSC - Mean Standard Chord



The diagram applies to both the Aerobatic and Standard versions of the glider.

Examples for determining the c.g. location are given in Technical Service Manual SZD-59-1, item 9.2.

2.6. Approved manoeuvres

This glider is certified in “Aerobatic” and “Utility” categories.

For Aerobatic version the following aerobatic manoeuvres are approved:

spin
inverted spin
chandelle
loop
negative loop
stall turn
negative stall turn
tailslide
aileron roll
half aileron roll and half loop
half flick roll and half loop
immelmann
reverse half cuban
cuban eight
reverse cuban eight
flick roll
flick roll on descending line
flick roll vertically down
negative flick roll
negative flick roll on descending line
negative flick roll vertically down

For Standard version the following aerobatic manoeuvres are approved:

spin
lazy eight
chandelle
stall turn
loop
steep turns

The recommended entry speeds for particular aerobatic manoeuvres are contained in Section 4 item 4.5.8 of this Flight Manual.

2.7. Manoeuvring Load Factors

The following load factors must not be exceeded at the given airspeeds:

	VERSION		
	Aerobatic 13,2 m (43,31 ft)	Standard 15 m (49,21 ft)	
	V = 200 ÷ 285 km/h (108÷154 kn , 124÷177 mph)	200 km/h (108 kn, 124 mph)	265 km/h (143 kn, 164 mph)
maximum positive load factor	+7,0	+5,3	+4,0
maximum negative load factor	-5,0	-2,65	-1,5

NOTE: THE ABOVE APPLIES TO AIRBRAKES RETRACTED CONFIGURATION.

With airbrakes extended, the maximum positive load factor is +3.5 over the entire range of operating airspeeds.

2.8. Flight crew

The pilot + parachute mass must remain within the following limits:

- minimum 55 kg (121 lb),
- maximum 110 kg (242 lb).

WARNING: FOR PILOT + PARACHUTE MASS BELOW 70 kg (154 lb) USE OF THE REMOVABLE BALLAST WEIGHTS IS MANDATORY TO CORRECT THE C.G. LOCATION.
THE WEIGHTS ARE INSTALLED ON THE INSTRUMENT PANEL COLUMN I.A.W. THE FOLLOWING INSTRUCTION:

Pilot + parachute mass	Total mass of ballast weights
70÷60 kg (154÷132 lb)	8 kg (18 lb)
60÷55 kg (132÷121 lb)	10 kg (22 lb)

WARNING: FOR PILOT + PARACHUTE MASS ABOVE 90 kg (198 lb) THE USE OF BALLAST WEIGHTS IS PROHIBITED.

NOTE: THE GLIDER IS EQUIPPED WITH THE FOLLOWING BALLAST WEIGHTS:

mass of 4 kg (9 lb) – 2 pieces,
mass of 1 kg (2.2 lb) – 2 pieces.

2.9. Kinds of operation

The glider is certified in “Aerobatic” Category (13,2 m / 43,31 ft span) and “Utility” Category (15 m / 49,21 ft span, with water ballast in wings allowed).
It is certified for normal and aerobatics flying in VFR conditions by day.
With additional equipment installed (item 2.10) and observing the applicable requirements, cloud flying is permitted.

WARNING: THE FOLLOWING OPERATIONS ARE PROHIBITED:

- NIGHT FLYING,
- FLYING IN ANTICIPATED ICING CONDITIONS,
- AEROBATICS IN ROUGH AIR,
- SPINNING WITH WATER BALLAST,
- AEROBATICS WITH WATER BALLAST.

FOR “AEROBATIC” GLIDER VERSION FLYING WITH WATER BALLAST IS PROHIBITED.

2.10. Minimum equipment

The minimum equipment contains:

- airspeed indicator,
- altimeter,
- accelerometer,
- variometer,
- compass,
- 5-point safety harness.

The standard equipment, additional to the above listed, comprises:

- side-slip indicator,
- ballast weights.

For cloud flying, the glider should be equipped with a turn indicator.

2.11. Aerotowing

The maximum aerotowing airspeed is: 150 km/h (81 kn, 93 mph).
The towing cable shall have a weak link of nominal strength
690 daN (1521 lb) ± 10%.
The minimum length of aerotowing cable is: 20 m (66 ft)

WARNING: USE OF THE C.G. HOOK FOR AEROTOWING IS PROHIBITED.
FOR AEROTOWING ONLY THE FRONT HOOK SHALL BE USED.

2.12. Winch-launching

The maximum allowed winch-launching airspeed is:

150 km/h (81 kn, 93 mph)

The towing cable shall have a weak link of nominal strength

690 daN (1521 lb) ± 10%

WARNING: USE OF THE FRONT HOOK FOR WINCH-LAUNCHING IS PROHIBITED.
FOR WINCH LAUNCHING ONLY THE C.G. HOOK SHALL BE USED.
RETRACTION OF LANDING GEAR DURING WINCH LAUNCHING, IS PROHIBITED.

2.13. Limitations placard

OPERATING LIMITATIONS						
GLIDER VERSION	**AEROBATIC "A"**			**STANDARD "U"**		
AIRSPEEDS (IAS):	**km/h**	**kn**	**mph**	**km/h**	**kn**	**mph**
V_{NE} - never exceed	285	154	177	265	143	164
V_A - manoeuvring	200	108	124	200	108	124
V_T - aerotowing	150	81	93	150	81	93
V_W - winch launching	150	81	93	150	81	93
V_{LO} - undercarriage operation	285	154	177	265	143	164
MASSES:	**kg**		**lb**	**kg**		**lb**
MAXIMUM EMPTY GLIDER	270		595	280		617
ALL-UP WITH WATER BALLAST	---		---	540		1191
ALL-UP WITHOUT WATER BALLAST	380		838	390		860
MAXIMUM COCKPIT LOAD	116		256	116		256
MINIMUM COCKPIT LOAD	65		143	65		143
OTHER:						
TOWING CABLE WEAK LINK 690 ± 10% daN						
NIGHT FLYING PROHIBITED!						
SPINNING WITH WATER BALLAST PROHIBITED!						
AEROBATICS WITH WATER BALLAST PROHIBITED!						

NOTE: OTHER TABLES – SEE “TECHNICAL SERVICE MANUAL”

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SECTION 3.

EMERGENCY PROCEDURES

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3.1. Introduction

Section 3 provides a checklist and descriptions of procedures for coping with emergencies.

CHECKLIST

EMERGENCY PROCEDURES

1. **CANOPY JETTISON**
   - pull out the red hand grip above the instrument panel
   - push the canopy upwards

2. **BAILING OUT**
   - jettison the canopy
   - release the safety harness
   - pull up the legs and exit the cockpit
   - pay attention to clear wings and tail-unit
   - open the parachute

3. **SPINNING**
   - ailerons neutral
   - rudder opposite to rotation
   - pause 1÷2 sec (about ½ turn)
   - ease stick forward till the rotation stops
   - centralize the rudder
   - pull out of ensuing dive

3.2. Canopy jettison

To jettison the canopy in an emergency:

- pull out the canopy emergency jettison hand grip all the way (red colour – on top of the instrument panel),
- resolutely push the canopy upwards.

NOTE: IF THE CANOPY CANNOT BE JETTISONED, BREAK THE PERSPEX STARTING AT THE WINDOW. USE LEG FORCE, IF NECESSARY.

3.3. Bailing out

Bailing out is the final and obligatory emergency action if it is not possible to bring the glider to the ground in controlled flight.
To bail out:

- jettison the canopy i.a.w. item 3.2,
- release the safety harness,
- pull up the legs and bail out (if the glider is rotating e.g. spinning – bail out in the direction of rotation centre),
- open the parachute with a delay (depending on circumstances) i.a.w. its operating instructions.

NOTE: IF BAILING OUT BELOW 200 m AGL, THE PARACHUTE SHOULD BE OPENED IMMEDIATELY AFTER LEAVING THE COCKPIT, AVOIDING (WHEN POSSIBLE) COLLISION WITH THE GLIDER.

3.4. Stall recovery

3.4.1. Stall recovery in normal flight

The stalled glider drops down symmetrically or with a tendency for wing dropping. There is a clear warning in the form of buffeting.
Recovery is simple and reliable by releasing stick pressure (maintaining positive elevator deflection).

3.4.2. Stall recovery in inverted flight

The stalled glider drops down symmetrically or with a tendency for wing dropping. There is a clear warning in the form of buffeting. In stalled condition there are lateral and longitudinal oscillations.
Recovery is simple and reliable by slightly pulling the stick back (maintaining negative elevator deflection).

3.5. Spin recovery

3.5.1. Normal spin recovery

The typical recovery manoeuvre requires to:

- check ailerons in neutral position,
- deflect the rudder opposite to rotation,
- wait one half turn or about 1÷2 sec.,
- ease the stick forward till the glider rotation stops,
- centralize the rudder and recover from the dive.

The recovery delay is less than 1 turn.
Maximum height loss in recovery is about 190 m (623 ft).

CAUTION: NO PAUSE BETWEEN RUDDER AND ELEVATOR DEFLECTIONS MAY DELAY RECOVERY BY UP TO 1½ TURN.

CAUTION: AILERON DEFLECTION IN THE DIRECTION OF THE SPIN MAY RESULT IN DELAYED RECOVERY.

3.5.2. Inverted spin recovery

The typical recovery manoeuvre requires to:

- check the ailerons in neutral position,
- put rudder in neutral position,
- pull the stick back till the glider rotation stops,
- recover from the dive.

The recovery is instantaneous or with only a slight delay.
Maximum height loss in recovery is about 220 m (722 ft).

CAUTION: RECOVERING FROM VERTICAL ATTITUDE TO INVERTED FLIGHT, DO NOT START TO PUSH BELOW AN AIRSPEED OF 120 km/h (65 kn, 74 mph)
PUSHING THE STICK SOONER CAUSES AN INVERTED STALL WITH INTENSE BUFFETING, HIGH SINKRATE AND INCREASED HEIGHT LOSS.

3.6. Spiral dive recovery

3.6.1. Normal spiral dive recovery

To recover from spiral dive:

- roll wings level,
- rudder neutral,
- pull out of the dive.

3.6.2. Recovery from inverted spiral dive

To recover from inverted spiral dive:

- roll upright (stick towards the sky),
- rudder neutral,
- pull out of the dive.

3.7. Other emergencies

3.7.1. Recovery from inverted to normal flight

Recover from inverted to normal flight by rolling upright (stick towards the sky). **NEVER** attempt to recover with half-loop downwards due to danger of exceeding the airspeed limits and excessive loss of altitude.

3.7.2. Landing with undercarriage retracted

Landing with undercarriage retracted may occur when it is impossible to correctly extend and lock it.
For a landing with undercarriage retracted:

- if possible, choose a smooth grass surface or a soft ploughed field,
- land against the wind,
- use a flat approach,
- touch down, if possible, with no airbrakes, no dropping down and no nose pitching down.

3.7.3. Ground looping

If it is unavoidably necessary to shorten the ground run at landing (e.g. to avoid collision with an obstacle) a controlled ground looping should be made, as follows:

- bank the glider onto a wing (in a direction away from an obstacle and, in case of crosswind component, against the wind if at all possible),
- when turning, neutralize the stick and deflect the rudder opposite to the turn.

3.7.4. Breaking or unintended releasing of the towing cable

In case the towing cable breaks, or releases unintentionally at low altitude, it is necessary to:

- release the tow-cable (if the cable remained attached to the glider),
- choose a suitable landing site,
- extend the undercarriage,
- tighten the shoulder harness.

In case of unavoidable collision with terrain obstacles off the airfield,

BY ALL MEANS AVOID A HEAD-ON CRASH!

SECTION 4.

NORMAL PROCEDURES

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4.1. Introduction

Section 4 provides checklists and descriptions of procedures for normal operation of the glider.

4.2. Rigging and de-rigging

Glider rigging and de-rigging requires 4 persons, or 3 persons if suitable supports are available.
Before rigging, all mating surfaces of connection fittings should be cleaned with a rag and greased.

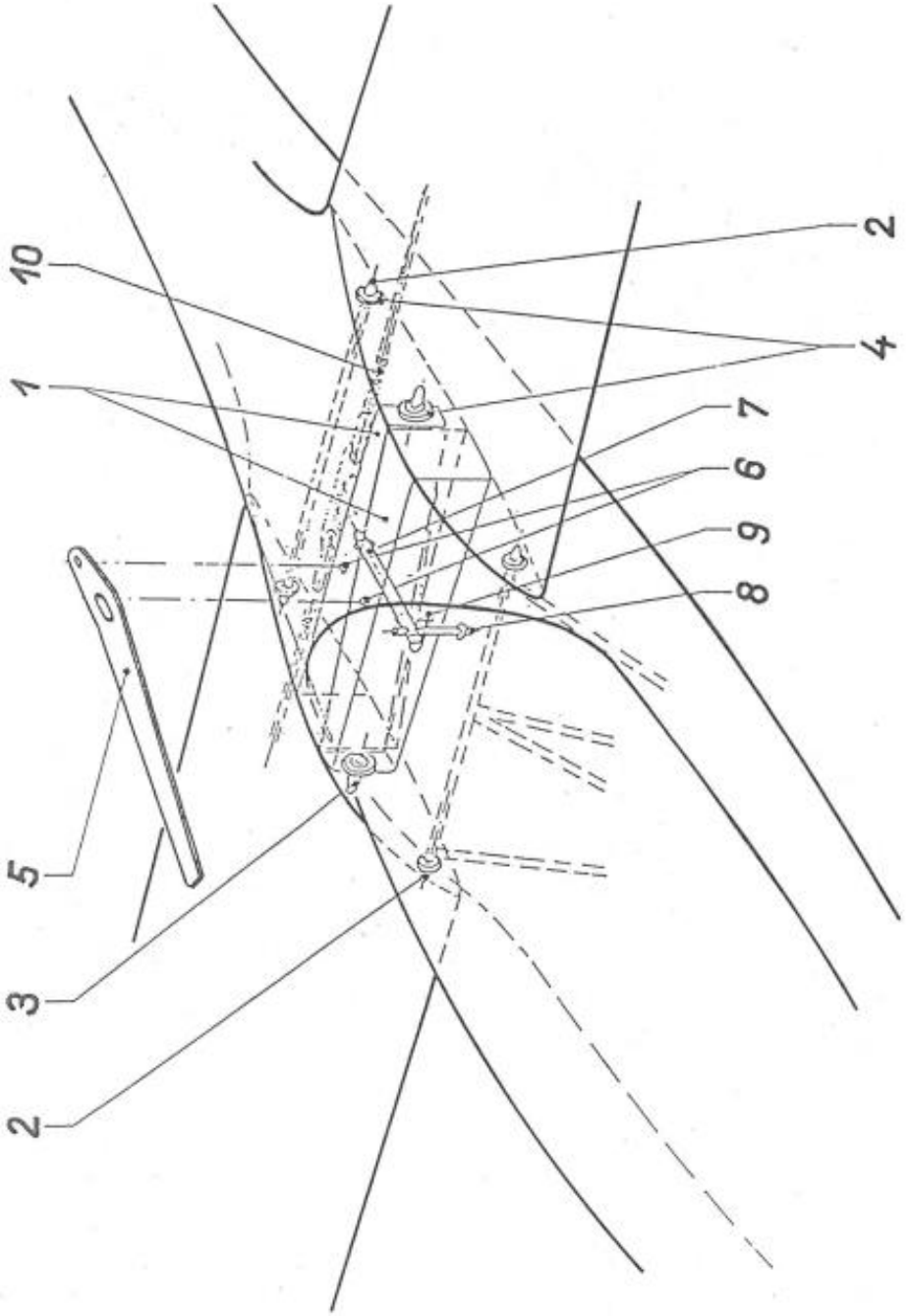
4.2.1. Wing rigging

- Put the air brake and water ballast control hand-grips in the cockpit into the „closed” position.
- Retract the air brakes in the wing.
- Slide the spar ends (1) first of the right-hand and then of the left-hand wing into the fuselage. Mating with the fuselage, the spikes (2) protruding from the fuselage and the spar spikes (3) should fit into the ball sockets (4) on the wing root-rib.
- Put the assembling tool (5) onto the feet (6) on the spars, and pull the wings together.
- Insert the main bolt (7) and secure it with a pin through the hole (8) in the bolt-handle (9).
- Connect the aileron control push-rods in the wings with the quick-connecting ends (10).
- The air brake controls connect automatically.

De-rigging of wings

- disconnect the aileron control rods,
- support the wing tips, unlock and remove the main bolt,
- pull the wings out of the fuselage, one after another.

WING ASSEMBLY



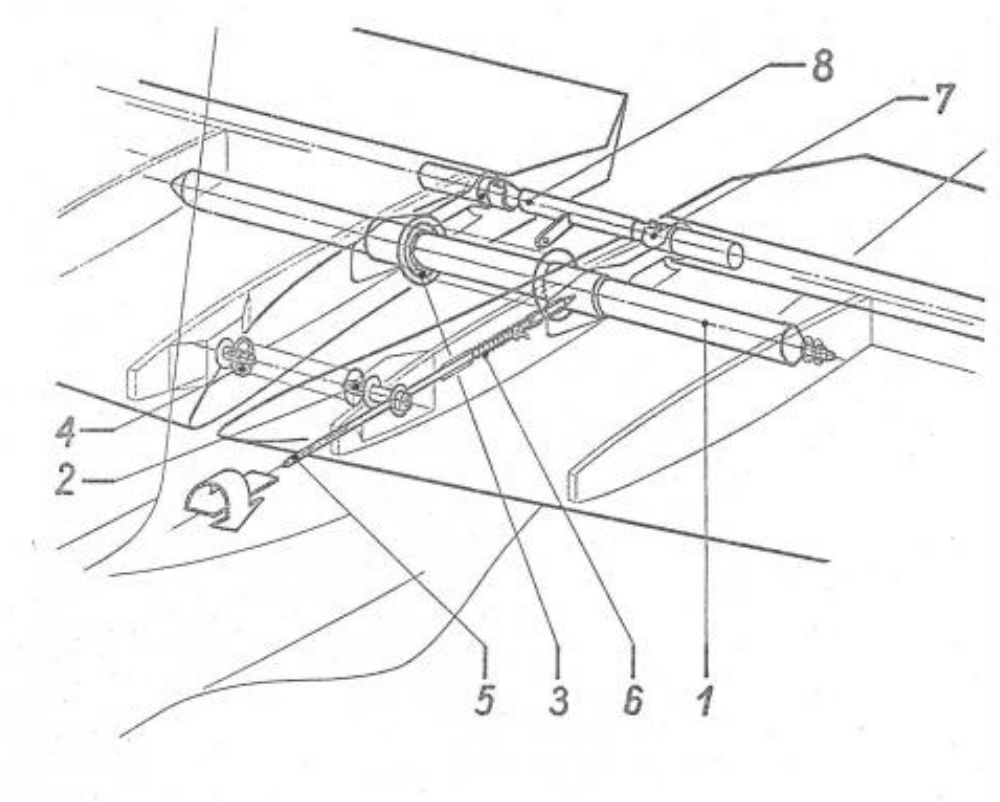
4.2.2. Tailplane rigging

- Insert the tubular spar (1) and the front spike of the right-hand tailplane half into the sockets (3) and (4) on the fin.
- Pull out the safety bolt (5) protruding from the leading edge of the left-hand tailplane half, and lock it in this position by turning it 90° in either direction.
- Slide the left-hand tailplane half onto the protruding end of tubular spar (1) and simultaneously insert the front spike (2) into socket (4) on the fin. When inserting the tailplane, pay attention to the automatic connection of the elevator control coupling socket (7) with the ball ends of control lever (8).
- Secure the tailplane by rotating the bolt (5) 90° in either direction, and insert it into the hole on the tubular spar. The bolt is maintained in this position by a spring (6). The bolt is correctly secured when its red-painted part is not visible.

Tailplane de-rigging

De-rigging of the tailplane is done in reverse sequence.

TAILPLANE ASSEMBLY



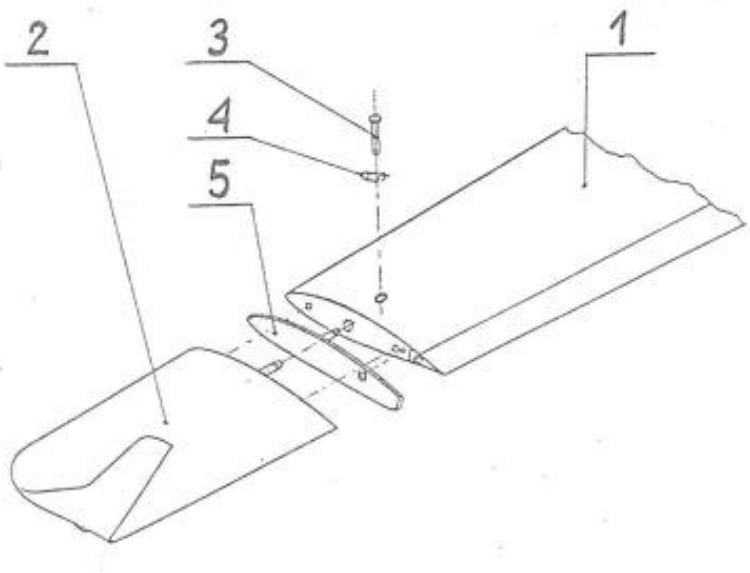
4.2.3. Mounting of wingtips

- Screw off the wing end plate (5).
- Remove the safety pin (4) and pull out the securing bolt (3).
- Pull off the wing end plate.
- Insert the wing tip stub (2) into the wing sleeve (1). Mating the parts, the spikes protruding from the wing tip should fit into the sockets on the wing end rib.
- Insert the securing bolt (3) and lock it with the safety pin (4).

Dismounting of wingtips

Dismounting of the wingtips is done in reverse sequence.

MOUNTING OF WINGTIPS



4.3. Daily inspection

Before flying, the glider should be carefully inspected. This concerns also the gliders stored in a hangar because they are exposed to damage during manoeuvring or when in rest (e.g. rodents).

Check during the inspection:

1. Glider documents, validity of Certificate of Airworthiness, complete the records.
2. Condition of structure and surfaces (external inspection).
3. Correct locking of the wing and tailplane bolts.
4. Connections of aileron and elevator control systems.
5. Canopy and its emergency jettisoning system.
6. No loose elements or foreign objects in cockpit and in vicinity of control systems, correct stowage of assembling tool.
7. Free movements and plays in control systems.
8. Undercarriage condition, wheels rollability, tyre pressure of the wheel (by eye), cleanness of the undercarriage well.
9. Operation and reliability of wheel brake.
10. Condition and operation of towing hooks.
11. Condition and correct retracting of the airbrakes.
12. Correct, symmetrical operation of water ballast valves of wing tanks.
13. Correct rigging, operation and eventual failures of horizontal and vertical tailplane.
14. Fuselage condition, especially over its lower portion.
15. Instruments, pressure ports, battery connection.
16. Transceiver, make a communication test.

4.4. Preflight inspection

Inspection before flights

Pre-flight check:

1. Locking of control systems connections and rigging bolts.
2. Free movement and full deflection of control surfaces.
3. Glider loading as specified in Section 6 of this Manual.
4. Tail dolly removed.
5. Back rest properly fitted and secured.
6. Parachute condition.
7. Assembling and securing of both wingtips connection.

Before take-off checks

The list of procedures, to be followed by the pilot immediately before take-off, is positioned at the base of instrument panel.

BEFORE TAKE-OFF CHECKS	
1. WING ENDS removed before aerobatic flights	- CHECK
2. WATER BALLAST TANKS empty before aerobatic flights	- CHECK
3. BALLAST WEIGHTS	- CHECK
4. PARACHUTE	- PUT ON
5. SAFETY HARNESS	- FASTEN
6. UNDERCARRIAGE LOCKING	- CHECK
7. CONTROL DEFLECTIONS	- CHECK
8. AIRBRAKES	- LOCKED
9. TRIM set for take-off	- CHECK
10. ALTIMETER zero or field elevation	- CHECK
11. CANOPY	- CLOSE
12. RADIO	- CHECK
13. TOWING CABLE CONNECTION	- CHECK

4.5. Normal procedures and recommended speeds

4.5.1. Aerotowing and winch-launching

Aerotowing

For aerotowing:

- Use a towing cable of minimum 20 m (66 ft) length,
- before take-off with water ballast in Standard version, check the lateral balance of glider,
- in case of crosswind, take-off with a crosswind component not exceeding 15 km/h (8 kn, 9 mph) is allowed.

Recommended take-off technique:

- put the trim lever in positions between 4 for a light pilot and 7 for a heavy one,
- in the initial phase of the ground run push the stick till the tail raises, the further ground run should be performed on the main wheel,
- at a height of least 100 m (330 ft) AGL retract the undercarriage and adjust the longitudinal trim as necessary.

Recommended aerotowing airspeed in climbing flight is 105 to 120 km/h (57 to 65 kn, 65 to 74 mph), depending on wing loading.

Winch-launching

When winch-launched:

- before take-off with water ballast in Standard version check the lateral balance of glider,
- in case of crosswind, take-off with a crosswind component not exceeding 15 km/h (8 kn, 9 mph) is allowed.

Recommended take-off technique:

- put the trim lever between position 1 for a light pilot and 3 for a heavy one,
- in the initial phase of the ground run push the stick till the tail raises, the further ground run should be performed on the main wheel,
- in case the wing drops down during ground run, release the cable immediately.

The recommended launching speed is 100 to 120 km/h (54 to 65 kn, 62 to 74.5 mph) depending on wing loading.

WARNING: RETRACTION OF THE UNDERCARRIAGE DURING WINCH-LAUNCHING IS PROHIBITED.

4.5.2. Free flight

Flight at low speed and stalling characteristics

SZD-59 behaviour in flight at a low airspeed down to the stall is normal, typical for most gliders. Stalled, the glider drops down symmetrically or with a tendency for wing dropping.
The stall warning is present in the whole range of c.g. locations. In normal flight the stall warning buffeting occurs at an airspeed 5 km/h (3 kn, 3 mph) above, and in inverted flight at an airspeed 15 to 20 km/h (8 to 11 kn, 9 to 12 mph) above the stall airspeed values given in the table of item 5.2.2.

Side-slip

Behaviour of the glider in side-slip depends on the airspeed as follows:
In the airspeed range from 90 up to approx. 160 km/h (49 to 86 kn, 56 to 99 mph) - depending on c.g. location – the glider increases the side-slip angle in line with increasing aileron and opposite rudder deflections without rudder force reversal up to a bank angle of ϕ=10°. Neutralizing ailerons and rudder recovers automatically to symmetric flight.

Increasing bank above ϕ=10° may cause a spontaneous increase of bank up to ϕ=30° and a rudder force reversal of about 5 to 11 daN. The reversal force can be overcome without difficulty. An increase in airspeed removes the force reversal and neutralizing controls recovers to symmetrical flight.

In the airspeed range above 160 km/h (86 kn, 99 mph) up to V_{NE}, and below 90 km/h (49 kn, 56 mph) the glider with increasing aileron and opposite rudder deflections enters the side-slip without a tendency to automatically steepen it and without any force reversal tendency.
Neutralizing the controls always recovers to symmetrical flight.

Side-slip behaviour in inverted flight is similar to that described above, but the rudder force changes considerably less, the control force decreases but does not change the direction, and neutralizing the rudder in any side-slip phase recovers to symmetrical inverted flight.

Side-slip behaviour in landing configuration (landing gear and airbrakes extended) is similar to that in ″clean″ configuration. Side-slip is efficient as a manoeuvre to steepen descent on approach and can be safely performed within the airspeed range from recommended on approach speed up to V_A = 200 km/h (108 kn, 124 mph).
There is little rudder force reversal and it can be overcome easily.
Airspeed indicator readings are erratic and unreliable. Partial water ballast has no influence on the side-slip characteristics.

Recommended airspeed in side-slip: 120÷140 km/h (65÷76 kn, 74÷87 mph).

4.5.3. Approach

The water ballast should be jettisoned (concerns the Standard version) in due time before landing, since jettison of the full ballast takes 7 minutes.
Extend the undercarriage not lower than 200 m (655 ft) AGL – push the undercarriage control hand-grip forward resolutely and check the locking-button out.

Approach with the airspeed:

- 95 km/h (51 kn, 59 mph) – non ballast configuration (both versions),
- 110 km/h (59 kn, 68 mph) – with water ballast in wings (Standard version only).

The yellow triangle on the airspeed dial marks the recommended minimum approach airspeed for the maximum glider all-up mass without water ballast.
Adjust the flight path inclination by means of airbrakes.

NOTE: IF UNAVOIDABLE, LANDING WITH WATER BALLAST IS ALLOWED, BUT THEN ON AIRFIELDS ONLY.

4.5.4. Landing

Touch down on two points.

Pull the stick back during ground run for better directional control.

During the ground run with front c.g. location use the wheel brake gently. Stronger braking leads to a “nose down pitching” tendency.

4.5.5. Flight with water ballast

The wing water ballast allows to adjust the optimum wing loading to the weather conditions during the flight.
The water ballast tanks capacity is 2 x 75 l.

NOTE: IT SHOULD BE REMEMBERED THAT THE INCREASED WING LOADING RESULTS IN INCREASED SINKING SPEED, TAKE-OFF GROUND RUN AND AEROTOWING AIRSPEED.

Water filling

Before the water is filled, check that the vent tubes are free from obstructions by blowing air into tanks with the water jettison valves opened.
Ballast tanks should be filled only using the funnel delivered together with the glider, using a flow of a clear water. Before inserting the funnels the water control hand-grip should be moved back and the wings levelled. Fill the tanks until the water flows out of the venting holes.
When both tanks are filled move the control hand-grip forwards, which pushes the funnels out of the jettison openings.
Take the funnels out of the wing. Check the lateral balance and eventually correct it by pouring out the water from one tank, when closing by hand the jettison opening of the second tank.
Shift the control slider for few seconds into the “open” position. Check the symmetry of water jettisoning from valves on both wings.
The amount of water ballast should be adjusted so that the all-up mass of the glider is not exceeded.

NOTE: FILLING THE WATER UNDER PRESSURE DIRECTLY FROM THE WATER SUPPLY IS PROHIBITED.

Water jettison

Water is jettisoned when the water control hand-grip is pushed forward.
Emptying of full tanks takes 7 minutes.

4.5.6. High altitude flight

It should be remembered that in line with increasing altitude the real airspeed is higher than indicated.

Therefore the maximum permissible airspeed V_{NE} should be reduced according to the table, item 2.2, of this Manual.

CAUTION: FLYING IN ICING CONDITIONS IS NOT RECOMMENDED. DIFFICULTIES IN MOVING CONTROL SURFACES AND, IN EXTREME CONDITIONS, LOCKING OF THE CONTROLS BY ICE SHOULD BE TAKEN INTO ACCOUNT.

In case an onboard thermometer is not available, the following maximum flight altitudes should not be exceeded when flying with water ballast:

Temperature	°F	56,0	63,5	75,2	88,0	100,0
on ground at take off	°C	13,5	17,5	24,0	31,0	38,0
Limit flight	ft	4900	6550	9800	13100	16400
altitude	m	1500	2000	3000	4000	5000

4.5.7. Flight in rain

Flying in rain, a degradation of glider performance should be taken into account.

In circling and approach increase the airspeed by about 10 km/h (5 kn, 6 mph).

In poor visibility or moisture conditions open the window and cockpit ventilation.

If the glider has been wetted by rain, it should be dried before take-off.

Do not enter icing conditions if the glider is wet.

4.5.8. Aerobatics

WARNING: AEROBATICS WITH WATER BALLAST ARE PROHIBITED.

Before aerobatics check:

- locking of airbrakes and undercarriage,
- tightness of safety harness.

Trim the glider for 120 to 150 km/h (65 to 81 kn, 74 to 93 mph) airspeed.
Do not change the trim setting during aerobatic manoeuvres.

AEROBATIC VERSION (WINGTIPS REMOVED)

In the table below the allowed aerobatic manoeuvres and recommended entry speeds are listed:

AEROBATIC MANOEUVRE	Entry Airspeed			Acceleration g
	km/h	kn	mph	
Spin	69	37	43	about 2,8
Inverted spin	107	58	66	about -2,5
Chandelle	180÷200	97÷108	112÷124	3,5
Loop	180÷200	97÷108	112÷124	3,5
Negative loop (upwards)	260÷270	140÷146	161÷167	-3,5
Stall turn	190÷210	103÷113	118÷130	3,5
Negative stall turn	260÷270	140÷146	161÷167	-3,5
Tail slide	min. 200	min.108	min. 124	3,5
Half flick roll and half loop	90÷100	49÷54	56÷62	3,2
Half aileron roll and half loop	140÷150	76÷81	87÷93	3,5
Immelman	220÷250	119÷135	136÷155	4,0
Aileron roll	min. 180	min. 97	min. 112	–
Reverse half Cuban	250	135	155	3,5
Cuban eight	190÷200	103÷108	118÷124	3,5
Reverse Cuban eight	230÷250	124÷135	143÷155	3,5
Flick roll	150	81	93	4,8
Flick roll on descending line	130	70	81	4,0
Flick roll vertically down	120	65	74	3,5
Negative flick roll	140÷150	76÷81	87÷93	-3,6
Negative flick roll on descending line	130	70	81	-3,8
Negative flick roll vertically down	120	65	74	-3,9
Rolling turn inside / outside	min. 180	min. 97	min. 112	+/-2,0

STANDARD VERSION (WINGTIPS INSTALLED)

In the table below the allowed aerobatic manoeuvres and entry speeds are listed:

AEROBATIC MANOEUVRE	Airspeed			Acceleration g
	km/h	kn	mph	
Spin	69	43	37	about 2.8
Loop	180÷200	112÷124	97÷108	3,5
Stall turn	190÷210	118÷130	103÷113	3,5
Chandelle	180÷200	112÷124	97÷108	3,5
Lazy eight	160÷180	99÷112	86÷97	2,5
Steep turns	120	74	65	2,0

Performing aerobatic manoeuvres does not require any special control techniques.

NOTE: UPRIGHT SPINS SHOULD BE PERFORMED WITH AILERONS NEUTRAL. AILERON DEFLECTION IN DIRECTION OF RUDDER CAUSES PRONOUNCED LONGITUDINAL OSCILLATIONS AS WELL AS ACCELERATION OR DECELERATION OF AUTOROTATION. OSCILLATIONS ARE PARTICULARLY STRONG WITH AFT C.G. LOCATION. RECOVERY WILL BE DELAYED BY 1 TURN.

WITH AILERON OPPOSITE TO RUDDER SPIN WILL STOP AFTER A MAXIMUM OF 1 TURN. THE GLIDER GOES INTO A SLIPPING ROTATION IN THE DIRECTION OF AILERON DEFLECTION.

IN STANDARD VERSION WITH FRONT C.G. LOCATIONS AND AILERONS DEFLECTED IN DIRECTION OF RUDDER, OR RUDDER NEUTRAL, THE GLIDER WILL SPIN A MAXIMUM OF 1 TURN BEFORE GOING INTO A SPIRAL DIVE.

NOTE: INVERTED SPINS SHOULD BE ENTERED WITH AILERONS OPPOSITE TO RUDDER. WITH NEUTRAL AILERON AND FRONT C.G. LOCATIONS THE GLIDER STOPS THE ROTATION AFTER ½ TURN AND ENTERS A DIVE. RETAINING PRO-SPIN CONTROLS MAY EITHER CAUSE CONTINUED DIVING, WHICH SHOULD BE RECOVERED IMMEDIATELY, OR ENTRY INTO ANOTHER INVERTED SPIN.

WITH REAR C.G. LOCATIONS THE GLIDER MAY ENTER THE INVERTED SPIN OR AFTER 1 TURN IT MAY GO INTO AN INVERTED SPIRAL DIVE WITH INCREASING AIRSPEED FROM WHICH IT SHOULD BE RECOVERED IMMEDIATELY.

WITH AILERONS DEFLECTED IN THE DIRECTION OF THE RUDDER, THE GLIDER AT ONCE ENTERS AN INVERTED SPIRAL DIVE WITH INCREASING AIRSPEED FROM WHICH IT SHOULD BE RECOVERED IMMEDIATELY.

Spin and spiral dive recovery procedures are described in items 3.5 and 3.6 of this Flight Manual.

NOTE: IN NORMAL FLICK ROLLS WITH C.G. RANGE OF 27÷36 PER CENT OF MSC (LIGHT PILOT), RECOVERY SHOULD BE INITIATED AFTER ½ ROTATION.
RECOVERY SHOULD BE INITIATED BY “PUSHING” THE STICK AND THEN RUDDER DEFLECTION OPPOSITE TO THE ROTATION.
DELAYED RECOVERY MAKES STOPPING THE ROTATION ON INTENDED DIRECTION IMPOSSIBLE AND CAUSES THE GLIDER TO ENTER A SPIN.
FOR FLICK ROLLS DOWNWARDS THE RECOVERY SHOULD BE INITIATED 120°÷180° BEFORE THE INTENDED STOP.

CAUTION: INITIAL PRACTISE OF SPINS AND FLICK ROLLS SHOULD BE DONE AT A SAFE HEIGHT.

NOTE: TAIL SLIDES BACKWARD AS WELL AS FORWARD CAN BE PERFORMED WITHOUT PROBLEMS.

WARNING: PERFORMING A TAIL SLIDE, BEFORE THE COMPLETE STOP, IT IS MANDATORY TO BLOCK THE CONTROLS (HOLD THE STICK FIRMLY WITH BOTH HANDS AND BLOCK PEDALS WITH FEET). FAILING TO DO SO CAN CAUSE SERIOUS DAMAGE TO CONTROLS DURING THE SLIDE.

SECTION 5.

PERFORMANCE

5.1. Introduction 5.2
5.2. Approved data 5.2
5.2.1. Airspeed indicator system calibration 5.2
5.2.2. Stall speeds 5.3
5.3. Additional informations non-approved 5.4
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5.3.2. Flight polar 5.4

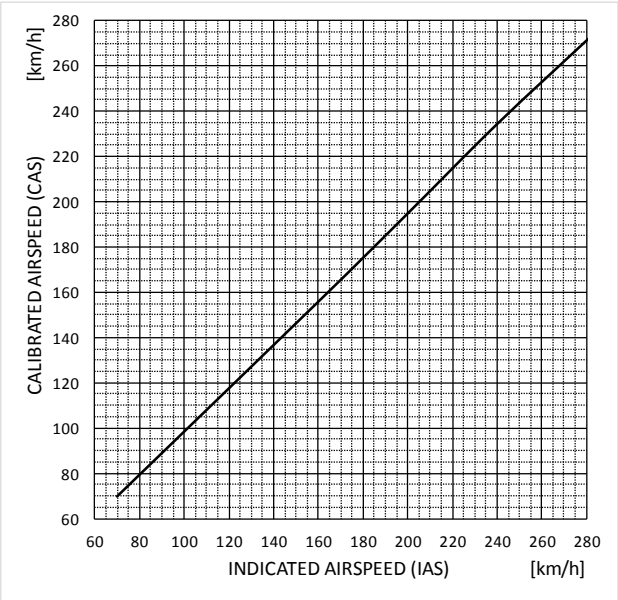
5.1. Introduction

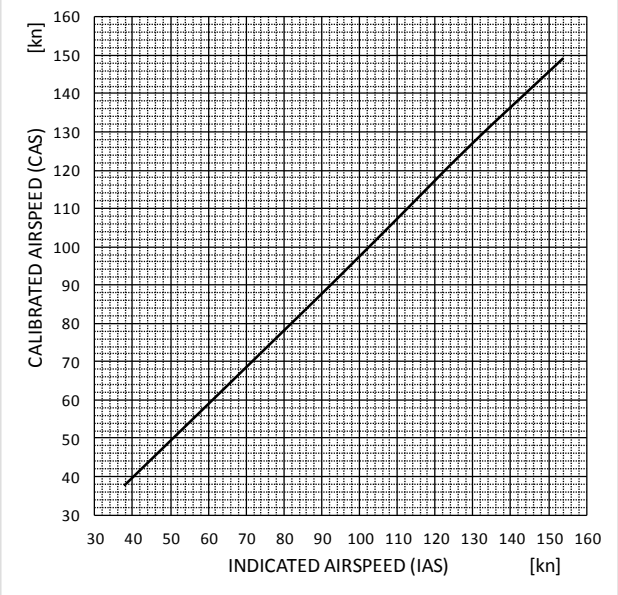
Section 5 provides approved data for airspeed indicator system calibration and stall speeds. It contains also other additional non-approved values and data.

The data in the tables have been gained as a result of flight tests performed on the glider in good condition and assuming average pilot's skill.

5.2. Approved data

5.2.1. Airspeed indicator system calibration





NOTE: THIS DIAGRAM SHOWS CAS VERSUS IAS.

CAS – Calibrated airspeed – airspeed indicator reading, corrected for instrument error and aerodynamic calibration error.

IAS – Indicated airspeed – airspeed indicator reading, corrected for instrument error only. The IAS values in this Manual are given under the assumption of zero instrument error.

5.2.2. Stall speeds

In the table below lists the stall speeds (IAS) in various flying conditions with maximum glider mass and most unfavourable c.g. location:

	AEROBATIC		STANDARD	
	normal flight	inverted flight	without water ballast	with water ballast
Stalling in straight flight	74 km/h 40 kn 46 mph	109 km/h 59 kn 68 mph	73 km/h 39 kn 45 mph	85 km/h 46 kn 53 mph
Stalling in 45° banked turn	89 km/h 48 kn 55 mph	128 km/h 69 kn 79 mph	88 km/h 48 kn 55 mph	102 km/h 55 kn 63 mph
Stalling in straight flight with airbrakes extended	79 km/h 43 kn 49 mph	111 km/h 60 kn 69 mph	78 km/h 42 kn 48 mph	92 km/h 50 kn 57 mph

The extended undercarriage does not affect the stall-speed.

The height loss during the stall recovery is:

- stall in normal flight, about 50 m (165 ft),
- stall in inverted flight:
  - to inverted flight about 50 m (165 ft),
  - to normal flight 220 m (720 ft).

The stall recovery procedures in normal and inverted flight are described in item 3.4 of this Manual.

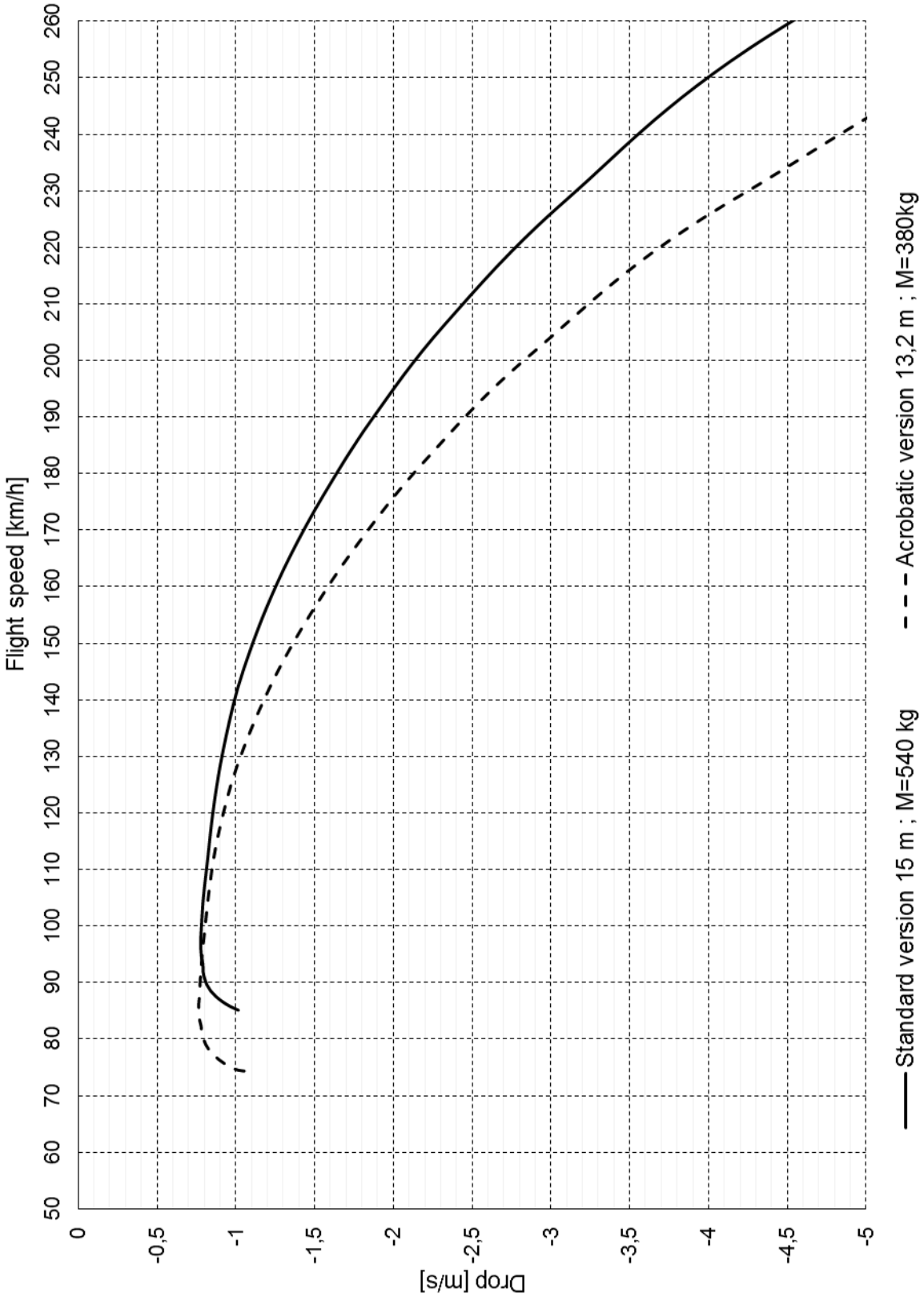
5.3. Additional informations non-approved

5.3.1. Demonstrated crosswind performance

The correct behaviours in take-off and landing with crosswind have been demonstrated for side wind component of:

- at aerotowing 15 km/h (8 kn, 9 mph),
- at landing 15 km/h (8 kn, 9 mph).

5.3.2. Flight polar (calculated)



SECTION 6.

MASS AND BALANCE

6.1. Introduction 6.2

6.2. Record of mass and c.g. location, allowable range of useful load 6.2

6.1. Introduction

In this Section the useful load range at which the glider can be safely operated is specified.

The glider weighing procedure and calculations of allowed useful load range and the list of available glider equipment, as well as the equipment installed on the weighed glider, are contained in the respective chapters of the Technical Service Manual.

6.2. Record of mass and c.g. location, allowable range of useful load

The data contained in the following tables, are mandatory only for the glider the Fact. No of which is shown on the head page of this Manual.

The loading plan is to be calculated i.a.w. the last weighing.

Valid for Fact. No

Aerobatic version:

Date	Empty glider mass	c.g. location	Allowed pilot + parachute mass		Approval	
			Maximum	Minimum	Date	Signature

Standard version:

Date	Empty glider mass	c.g. location	Allowed pilot + parachute mass				Approval	
			with water ballast		without water ballast		Date	Signature
			Max	Min	Max	Min		

For calculation of permissible maximum and minimum pilot’s mass see chapter 9.2 of Technical Service Manual.

Load in pilot's cockpit "A"	Load in instrument panel "B"	Load in central luggage compartment "C"	Load in rear luggage compartment "D"
55 thru 75 kg (121 thru 165 lb)	max. 4 kg (9 lb)	max. 20 kg (44 lb)	max. 8 kg (18 lb) For every 1 kg (2 lb) load 0,5 kg (1 lb) in instrument panel
75 thru 100 kg (165 thru 200 lb)	max. 4 kg (9 [lb])	max. 20 kg (44 lb)	max. 8 kg (18 lb)
100 thru 110 kg (220 thru 243 lb)	max. 4 kg (9 lb) For every 0,5 kg (1 lb) load 1 kg (2 lb) in rear luggage compartment	max. 16 kg (35 lb)	max. 8 kg (18 lb)
NOTE:	BALLAST WEIGHTS "G" FOR PILOT OF MASS: 55 kg (121 lb) thru 60 kg (132 lb) - total mass 10 kg (22 lb) - MANDATORY 60 kg (132 lb) thru 70 kg (154 lb) - total mass 8 kg (18 lb) - MANDATORY above 90 kg (198 lb) - PROHIBITED		

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SECTION 7.

GLIDER AND SYSTEMS DESCRIPTION

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7.2. Flight controls In cockpit 7.2
7.2.1. Aileron and elevator control 7.2
7.2.2. Rudder control 7.2
7.2.3. Longitudinal trimming 7.2
7.2.4. Towing hook release 7.2
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7.10.3. Sanitary system 7.5

7.1. Introduction

This Section provides a description of the glider and its systems and information on their operation.

The details of additional systems and equipment are contained in Section 9.

7.2. Flight controls in cockpit

7.2.1. Aileron and elevator control

The aileron and elevator are actuated by a standard control stick.

The radio transmission push-to-talk button is located on the control stick.

7.2.2. Rudder control

The rudder pedals are adjustable on ground and in flight.

The pedal latch control (brown colour) is located on the instrument panel column, righthand.

With the hand-grip pulled, the pedals can be moved by legs.

Releasing the hand-grip locks the pedals in the nearest of the 5 adjustable positions.

7.2.3. Longitudinal trim

The elevator trimming spring is controlled with a hand-grip (green colour) to the left of the stick (9 adjustable positions).

7.2.4. Towing hook release

The release hand-grip (yellow colour) is located on the instrument panel column, lefthand.

Pulling the hand-grip releases both tow-hooks.

To connect the towing cable pull the yellow hand-grip, insert the cable link into the hook and release the hand-grip.

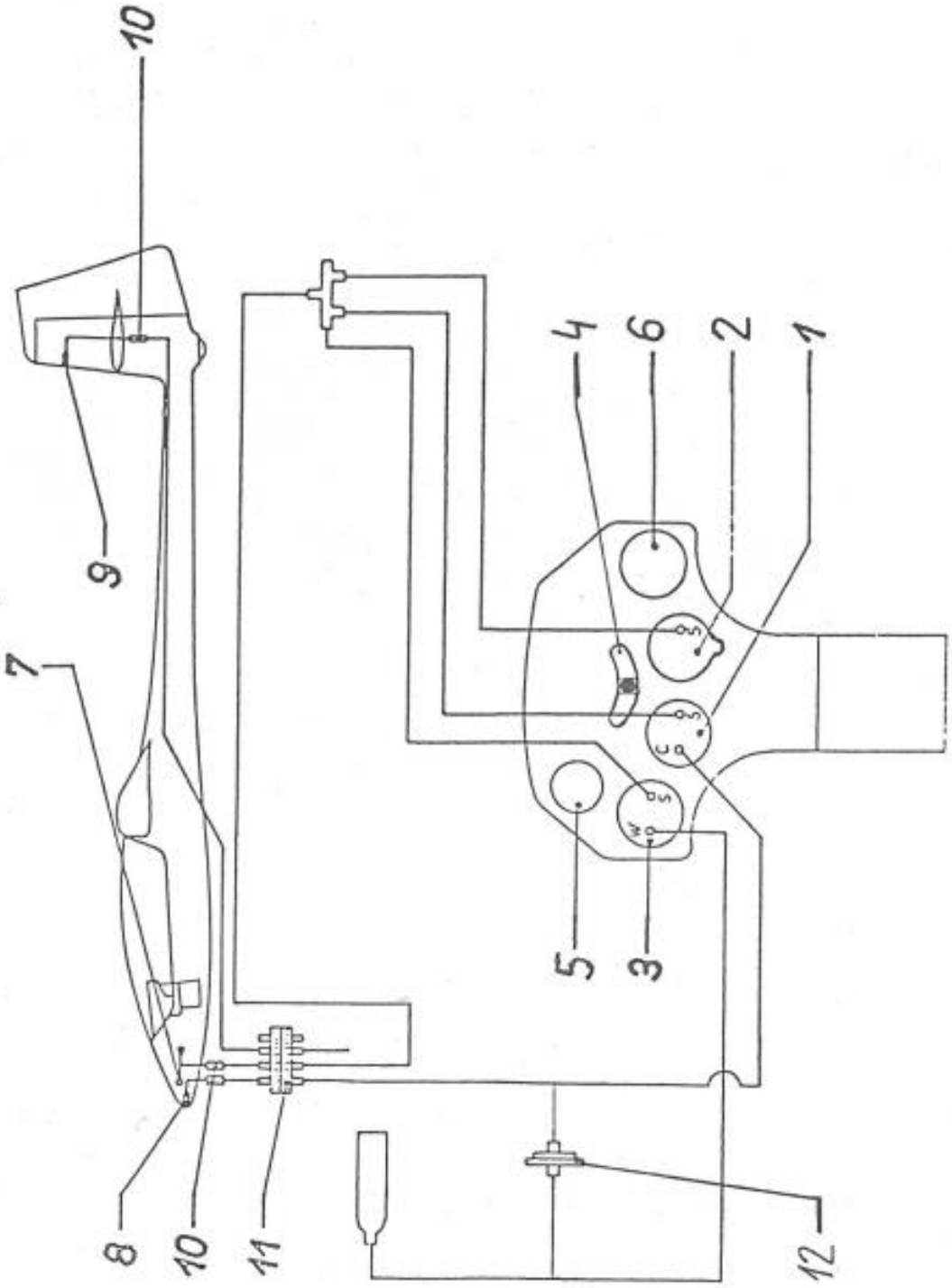
Then check the correct locking of the tow-hook.

7.3. Instrument panel

The standard equipment of instrument panel comprises the following set of instruments (see drawing):

(1) airspeed indicator
(2) altimeter
(3) variometer
(4) side-slip indicator
(5) compass
(6) accelerometer
(12) compensator of total energy variometer

INSTRUMENT SYSTEM SCHEME



7.4. Undercarriage

The undercarriage is controlled with a sliding handle on the righthand board. With the handle in the front position, the undercarriage is extended, in the aft position it is retracted. The handle has a locking latch with a red button. The extended or retracted undercarriage is correctly locked with the latch when the red button protrudes from the top of the handle and the marked point is visible on the side. The latch is released when the button is pressed.

The undercarriage well doors are closed automatically by means of springs.

The main wheel brake is controlled by means of a lever located on the airbrakes handle.

7.5. Cockpit, canopy, seat and safety harness

To open the canopy (upwards, forwards) two sliders (white colour) should be moved forwards. The canopy is automatically retained open by means of a gas-spring.
The cockpit allows for pilots up to 185 cm (6,1 ft) height, with a back parachute. The parachute or back pillow thickness shall not be less than 12 cm (4,7 in). The cockpit can be fitted to the pilot’s height by means of adjusting the pedals (item 7.2) and back rest (6 adjustable positions – on ground only). The back rest fixing bolts shall be located symmetrically and correctly locked in the holes.

The adjustable head-rest is fastened to the back rest.

The five-piece safety harness is part of the standard equipment.

7.6. Instrument system

The instrument system consists of (see drawing under item 7.3):

- instrument panel
- total pressure port in fuselage nose (8)
- two static pressure ports in fuselage front part (7)
- additional pressure port nest for special instruments (9)
- drainage units for total and static pressure ducts accessible in front of the instrument panel (10)
- drainage unit of the additional pressure circuit accessible through the inspection hole at the lower portion of the fin (10)
- duct joint (11), enabling disconnection of the instrument panel from the glider

7.7. Airbrakes

The airbrakes are controlled conventionally with a blue-painted sliding handle on the lefthand cockpit board.

7.8. Baggage compartment

The rear baggage compartment in the central fuselage part is accessible through the inspection hole. The baggage is fastened with straps attached to fixed holders. Maximum load mass in the rear baggage compartment is 8 kg (18 lbs).

The central baggage compartment in front of the spar ends is accessible from the cockpit. The baggage is fastened with straps attached to the provided holders. Maximum load mass in the central baggage compartment is 20 kg (44 lb).

Loading of dangerous or flammable materials in the baggage compartments is prohibited.

The allowed glider loading conditions are given in the “glider loading plan” (page 6.3) placarded on the lefthand board in the cockpit.

7.9. Water ballast control

Water ballast jettison is controlled by a handle with a white ball on the lefthand board. Pushing the handle forward opens the valves and jettisons the water.

7.10. Miscellaneous equipment

7.10.1. Radio Set

A two-way airband radio may be installed. As a standard, a tubular antenna is installed in the leading edge of the fin, with a cable leading to the instrument panel.

7.10.2. Ventilation

The cockpit is ventilated by means of a window with deflectable venting tab.

The inside of the canopy is ventilated through an opening in the top of the instrument panel. It is controlled with a knob (black colour) on the instrument panel column.

7.10.3. Sanitary system

The funnel of the sanitary system is located in the hole of seat pan.

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SECTION 8.

SAILPLANE HANDLING,

CARE AND MAINTENANCE

8.1. Introduction 8.2
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8.1. Introduction

This section contains manufacturer's recommended procedures for proper ground handling and servicing of the glider. The statements concerning the inspection and maintenance should be observed, to retain glider performance and dependability.

It is recommended to observe the specified lubrication plan and maintenance procedures depending on climate or special operation conditions.

8.2. Glider periodic inspections

The glider inspection should be performed at the beginning of every flying season.

The range and time periods of all inspections are contained in the Technical Service Manual of SZD-59-1 "ACRO" glider.

8.3. Glider repairs or alterations

Repairs and alterations are referred to in Repair Manual of SZD-59-1 "ACRO" glider.

In case of any alteration the Airworthiness Authority should be notified in advance, to ensure that the glider airworthiness is not affected.

8.4. Ground handling / road transportation

8.4.1. Ground handling

For ground handling the generally known rules for performance gliders with respect to securing against wind, towing cable connecting, anchoring, procedures with a wet glider, draining of the instrument pneumatic system should be observed.

NOTE: LEAVING THE GLIDER OUTSIDE WITHOUT A PROTECTION AGAINST ENVIRONMENTAL CONDITIONS AND SUNLIGHT LEADS TO DEGRADATION OF THE SURFACE COATING.

LEAVING THE COVERS ON GLIDER WINGS, WHILE EXPOSED TO STRONG INSOLATION, IS NOT RECOMMENDED AS WELL.

In case of prolonged pause in operation, glider de-rigging is recommended.

After de-rigging, the fittings and metal elements should be greased and the individual covers put on the glider components. Put the fuselage on the supports in front of the undercarriage well, and under the fin. Put the wings vertically on the supports under the leading edges at semi-span, and under the spar ends near the root rib. Release the pressure in the wheel tube.

If the glider is stored in rigged condition, the wing tips should be supported.

NOTE: DO NOT HANGAR IN WET COVERS.

It is recommended to move the glider on the ground “tail forward”.

Pulling at the wing tips should be avoided.

For motor car “nose forward” ground towing use a towing cable with a link, connected to the glider towing hook and secure the control stick with pilot’s lap-belt.

8.4.2. Road transportation

In case of trailer transportation, the glider components can be fastened on external surfaces with broad clasps padded with a soft material, or with broad straps.

Fasten the wings on spar ends and support on leading edge at semi-span. The fuselage can be fastened to the profiled support and immobilized with straps.

The tailplane should be fastened in clasps.

During a transportation, the mating surfaces of fittings, inspection holes and bearings should be protected against dust and dirt.

Immobilize the control surfaces. Protect the canopy perspex with a flannel cover.

In case of transportation in open trailer, the surfaces of glider components should be protected with individual covers and, in case of rain, with a foil too.

Protect carefully the pressure ports.

8.5. Cleaning and care

Moisture and sun have a harmful effect on the composite material and lacquer coats, therefore even the modern gliders require the proper maintenance and care.

Especially increased moisture with high temperatures should be avoided (e.g. poorly vented trailer with moisture accumulation exposed to sun). If moisture penetrates into hardly accessible structure areas, the glider should be de-rigged and its wet components dried.

In case the external surfaces are soiled (e.g. with insects) it is recommended to wash them with clear water with a gentle detergent without an abrasive agent. Dry the washed areas with a flannel rag (or shammy). Dry the glider wetted inside (airbrakes boxes), check the drainage holes to be free.

The lifting surfaces should be polished from time to time with a no-silicone polish, using movement along the chord, mechanically or by hand with a special slat.

The remnants of adhesive tapes should be washed off with extraction gasoline.

Canopy perspex should be cleaned with a special care agent or with a large amount of clear water. In no case a dry rag or similar may be used for removal of dust and dirt.

The safety harness should be regularly inspected for tears, wear, corroded fittings etc. Check from time to time the correct operation of the joining clamp.

SECTION 9.

SUPPLEMENTS

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9.3 Supplements inserted..... 9.2

9.1. Introduction

This Section contains the supplements necessary for safe and efficient operation of glider equipped with various optional systems and equipment, not delivered in standard version.

9.2. List of inserted supplements

Date of introduction	Document No.	Title of the inserted supplement

9.3. Supplements inserted